

## Electromagnetic Fields and Cancer in Children—A Scientific Fact?

TO THE EDITOR: According to the journal, the purpose of the "Epitomes—Important Advances in Clinical Medicine" section is to help busy investigators and practitioners keep informed of items "that have recently achieved a substantial degree of authoritative acceptance." The journal also states: "Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established both as to scientific fact and important clinical significance."

The occupational medicine epitomes in the February 1990 issue include an assessment of studies linking electromagnetic field (EMF) exposure to an increased risk of cancer in children.<sup>1</sup> The inconsistency of findings reported by investigators working on this topic does not result in evidence of a "firmly established scientific fact" with a high degree of acceptance within the scientific community.

The 1979 study from Colorado referred to in the epitome, linking electrical wiring configurations and childhood cancer, has been criticized by many scientists. As just one example, Miller criticized the indirect measures of exposure and pointed out that a dose-response relationship, which had been suggested by the Colorado investigators, was not present.<sup>2</sup> Regarding possible confounding factors, one of the authors of the 1988 Colorado study subsequently found that the incidence of childhood cancer was associated with residential traffic density.<sup>3</sup> Increased risks for total number of cases of cancers and leukemias were related to increased traffic densities. The odds ratios for these associations were greater than those reported earlier for EMFs and cancer.

The epitome mentioned that "a study from Texas found a greater frequency of paternal occupations (electronics workers) involving exposure to electromagnetic fields among children who had died of neuroblastoma." But in another study (included in the epitome's list of references but not mentioned in the text), Nasca and colleagues stated that their data "failed to show any consistent association between childhood central nervous system tumor risk and paternal exposures to . . . electromagnetic fields."<sup>4</sup> In a subsequent study, Johnson and Spitz concluded that "if parental exposures in these industries are related in some manner to childhood tumours, the attributable risk, based on projections from our data, would be relatively low."<sup>5</sup> In fact, the highest risk estimate in their study was for construction electricians, who work mainly with unenergized wiring and thereby seem to have limited exposure to EMFs.

In studies of animals, the evidence for a possible cancer-promoting effect of EMFs is nonexistent or equivocal. Attempts to replicate initial reports supposedly supporting the hypothesis of carcinogenicity have been unsuccessful. To use the simple ubiquity of exposure to EMFs as a justification for further studies, even when there is no clear effect on public health, is questionable. Foster and Pickard, regarding bioeffects in a different range of the electromagnetic spectrum (specifically microwaves), have said that "such searches for hazards can go on too long, and guidelines for ending them must be established."<sup>6</sup> The same may be true for studies of EMFs at lower frequencies, as well. Cartwright pointed out that "so far not enough is known about EMF variability to be able to design useful studies to investigate EMF health effects. . . . With our present state of knowledge there is no

justification for the massive expenditure. . . . Our present scientific knowledge points at the very best to a minute risk of EMF verging on the point of nonexistence."<sup>7</sup>

A few weak positive associations in epidemiologic studies do not constitute "important clinical significance," especially when additional studies showing no association are considered. The unsubstantiated claims of a link between EMF exposure and risks of cancer in children should not lead clinicians to believe that a hazard exists.

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### REFERENCES

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*The views and opinions expressed herein are those of the author and do not necessarily state or reflect those of the US Government.*

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### Dr Gold Responds

TO THE EDITOR: The letter from Dr Jauchem is welcomed for its illustration both of the complex and difficult nature of investigations in this field that often result in apparently conflicting findings and of the strength of responses generated to both positive and negative findings on this controversial subject.

Our original epitome was written to update clinicians and researchers on, and fulfilled the stated goal of keeping them abreast of, an active area of investigation and, though restriction on the length of epitomes precluded exhaustive review, to reflect the status of investigations up to the present time.<sup>1</sup>

"A few weak positive associations in epidemiologic studies" cannot be dismissed as having no clinical significance, even when there are additional studies showing no association. Weak positive associations can be important from both clinical and public health perspectives when the exposure of interest is highly prevalent, is of public concern, and when—as with childhood cancer—the potential outcome involves severe morbidity or lethality. As Rose points out, the relative risk estimate, to which scientists refer when discussing associations of exposures and disease outcomes, can be a misleading guide to policy.<sup>2</sup> Furthermore, as the calculation of population attributable risk reflects,<sup>3</sup> while the excess risk may be small, the total population attributable risk can be large if a sizable portion of the population is exposed. Thus, this is usually the more appropriate measure in making policy.<sup>2</sup>

The methodologic difficulties in conducting retrospective investigations of occupational and home electric magnetic field exposures were emphasized in the original epitome<sup>1</sup> and